

PATENT CLAIMS

1. A method of manufacturing a plastic oil pan having an integrated oil filter, the method comprising:
 - assembling a first filter component comprising a filter medium and an oil pan integrated surface section;
 - placing the first filter component into a first tool;
 - placing a second filter component in a second tool;
 - closing the second tool on to the first tool so that a first flange of the first filter component is pressed unto a second flange of the second filter component;
 - vibration welding the first flange to the second flange, whereby the second filter component is fixed upon the oil pan integrated surface section in a manner to create a hermetic seal between the second filter component and the oil pan integrated surface section; and
 - separating the second tool from the first tool and removing the plastic oil pan.
2. The method in accordance with claim 1, further comprising:
 - identifying that the first filter component and the second filter component are disposed such that at the completion of the vibration welding process the first filter component and the second filter component are assembled in a previously defined position.
3. The method in accordance with claim 2, further comprising:
 - identifying the relative position of the first filter component and the second filter component by positioning a plurality of engaging points.
4. The method in accordance with claim 3, wherein the plurality of engaging points are placed on an outer side of the first filter component.
5. The method in accordance with claim 3, wherein the plurality of engaging points are placed on an outer side of the second filter component.
6. The method in accordance with claim 3, further comprising:

identifying the relative position of the first filter component and the second filter component by mating the plurality of engaging points with a plurality of respective positioning aids.

7. The method in accordance with claim 6, wherein the plurality of positioning aids comprise a plurality of studs that are located in the first tool.
8. The method in accordance with claim 6, wherein the plurality of positioning aids comprise a plurality of studs that are located in the second tool.
9. The method in accordance with claim 1, further comprising:
verifying a position of the filter medium in the oil pan integrated surface section prior to closing the second tool on to the first tool.
10. The method in accordance with claim 1, further comprising:
holding the first filter component in position by vacuum suction prior to the closing the second tool on to the first tool.
11. The method in accordance with claim 1, further comprising:
holding the second filter component in position by vacuum suction prior to the closing the second tool on to the first tool.
12. The method in accordance with claim 1, further comprising:
closing a pump inlet of the second filter component with a plug prior to the placement of the second filter component in the second tool.
13. The method in accordance with claim 1, wherein the vibration welding is performed in a linear manner.
14. The method in accordance with claim 1, wherein the vibration welding is performed in a circular manner.
15. The method in accordance with claim 1, wherein the vibration welding is performed in an orbital manner.

16. The method in accordance with claim 1, further comprising:
inserting a metal bushings into a hole of an outer flange of the plastic oil pan.
17. The method in accordance with claim 16, wherein the insertion of the metal bushing is performed mechanically by means of a flexible tube into which a plurality of metal bushings are stacked in ascending order and by means of gravity will drop into a bushing assembly fixture at a dropping point.
18. The method in accordance with claim 17, wherein a plurality of metal bushings are essentially simultaneously inserted into a plurality of corresponding holes in the outer flange of the plastic oil pan.
19. The method in accordance with claim 18, further comprising:
grasping at least one hole of the holes with a positioning stud that positions the bushing assembly fixture relative to the holes.